CLAIMS

What is claimed is:

1. An apparatus comprising:

a switching mechanism to switch an input line between a first input voltage and a second input voltage;

a pulse generator coupled to the switching mechanism to generate an electronic pulse train at a high frequency in response to the first input voltage and an electronic pulse train at a low frequency in response to the second input voltage;

an oscillator circuit coupled to the pulse generator to receive the electronic pulse train; and

an ultrasonic transmitter coupled to the oscillator circuit to produce an ultrasonic signal at a frequency that is a function of a frequency of the electronic pulse train.

2. The apparatus of claim 1, further comprising a housing, and wherein the switching mechanism comprises a toggle switch moveable between a first position corresponding to the first input voltage and a second position corresponding to the second input voltage.

3. The apparatus of claim 2, wherein the pulse generator comprises a microcontroller unit that generates a digital pulse train.

4. The apparatus of claim 3, wherein the switching mechanism connects the microcontroller unit to a high voltage input when set in the first position and to a low voltage input when set in the second position.

5. The apparatus of claim 1, wherein:

the ultrasonic transmitter generates an ultrasonic signal at a high frequency in response to a high frequency electronic pulse train; and

the ultrasonic transmitter generates an ultrasonic signal at a low frequency in response to a low frequency electronic pulse train.

6. A system comprising:

an ultrasonic transmitting device, comprising an ultrasonic transmitter to produce an ultrasonic signal at one of a first frequency or a second frequency; and

an ultrasonic tracking device, comprising:

one or more ultrasonic receivers to receive the ultrasonic signal;

a frequency detector to generate a mode indicator signal that is a function of a frequency of the ultrasonic signal.

7. The system of claim 6, wherein the ultrasonic transmitting device further comprises:

a pulse generator to generate an electronic pulse train;

a switching mechanism coupled to the pulse generator to switch the logic between a first operating mode that produces an electronic pulse train at a high frequency and a second operating mode that produces an electronic pulse train at a low frequency; and

an oscillator circuit coupled to the pulse generator to receive the digital pulse train.

8. The system of claim 7, wherein:

the ultrasonic transmitter generator generates an ultrasonic signal at a high frequency in response to a high frequency electronic pulse train; and

the ultrasonic transmitter generates an ultrasonic signal at a low frequency in response to a low frequency electronic pulse train.

9. The system of claim 6, wherein the frequency detector generates a first mode indicator signal in response to an ultrasonic signal at a high frequency and a second mode indicator signal in response to an ultrasonic signal at a low frequency.

10. The system of claim 7, further comprising a computing device coupled to the ultrasonic tracking device, wherein the computing device comprises:

a processor;

a memory module comprising logic instructions which, when executed, configure the processor to:

receive the mode indicator signal from the ultrasonic tracking device; and

use the mode indicator signal to process one or more additional signals from the ultrasonic transmitting device.

11. The system of claim 10, further comprising:

a display; and

logic instructions which, when executed, configure the processor to:

locate a position on the display using information in the ultrasonic signal; and

apply an erase operation to the position on the display device in response to a first mode indicator signal.

12. The system of claim 10, further comprising:

a display; and

logic instructions which, when executed, configure the processor to:

locate a position on the display using information in the ultrasonic signal; and

apply a write operation to the position on the display device in response to a second mode indicator signal.

13. The system of claim 10, further comprising logic instructions which, when executed, configure the processor to:

select a plurality of pairs of digital ultrasonic signals to form two or more pairs of digital ultrasonic signals;

estimate time difference of arrival (TDOA) for each of the two or more pairs of digital ultrasonic signals;

determine an intersection of each pair of the TDOA estimated digital ultrasonic signals to form one or more intersections; and

determine a location of an ultrasonic signal generator corresponding to at least one of the one or more intersections.

14. A method comprising:

transmitting, from a first device, an ultrasonic signal at one of a high frequency or a low frequency; and

receiving, at a second device, the ultrasonic signal;

generating a mode indicator signal that indicates whether the ultrasonic signal is at the high frequency or the low frequency; and

using the mode indicator signal to process one or more additional ultrasonic signals from the first device.

15. The method of claim 14, wherein transmitting, from a first device, an ultrasonic signal at one of a first frequency or a second frequency comprises:

setting a switching mechanism to one of a first operating mode that generates an electronic pulse train at a high frequency and a second operating mode that generates an electronic pulse train at a low frequency; and

directing the electronic pulse train to an ultrasonic transmitter coupled to an oscillator circuit.

16. The method of claim 15, wherein

the ultrasonic transmitter generates an ultrasonic signal at a high frequency in response to a high frequency electronic pulse train; and

the ultrasonic transmitter generates an ultrasonic signal at a low frequency in response to a low frequency electronic pulse train.

17. The method of claim 14, wherein using the mode indicator signal to process one or more additional ultrasonic signals from the first device comprises:

locating a position on the display using information in the ultrasonic signal; and

applying an erase operation to the position on the display device in response to a first mode indicator signal.

18. The method of claim 17, wherein locating a position on the display using information in the ultrasonic signal comprises:

selecting a plurality of pairs of digital ultrasonic signals to form two or more pairs of digital ultrasonic signals;

estimating time difference of arrival (TDOA) for each of the two or more pairs

of digital ultrasonic signals;

determining an intersection of each pair of the TDOA estimated digital ultrasonic signals to form one or more intersections; and

determining a location of an ultrasonic signal generator corresponding to at least one of the one or more intersections.

19. The method of claim 14, wherein using the mode indicator signal to process one or more additional ultrasonic signals from the first device comprises:

locating a position on the display using information in the ultrasonic signal; and

applying an erase operation to the position on the display device in response to a second mode indicator signal.

20. The method of claim 19, wherein locating a position on the display using information in the ultrasonic signal comprises:

selecting a plurality of pairs of digital ultrasonic signals to form two or more pairs of digital ultrasonic signals;

estimating time difference of arrival (TDOA) for each of the two or more pairs of digital ultrasonic signals;

determining an intersection of each pair of the TDOA estimated digital ultrasonic signals to form one or more intersections; and

determining a location of an ultrasonic signal generator corresponding to at least one of the one or more intersections.